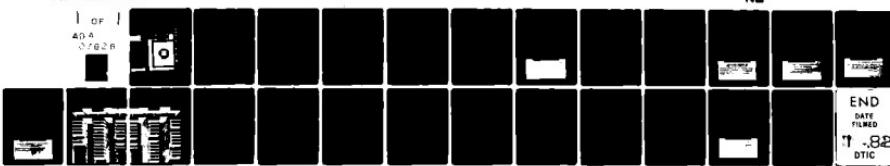


AD-A107 826 AIR FORCE PACKAGING EVALUATION AGENCY WRIGHT-PATTERSON--ETC F/6 15/5
PACKAGING NEW DIMENSION 80-(U)
1981

UNCLASSIFIED

NL



END
DATE FILMED
7-82
DTIC

AIR FORCE PACKAGING EVALUATION AGENCY
WRIGHT PATTERSON AIR FORCE BASE OHIO

AD-A147326

101

102

Packaging

NEW DIMENSION

ANNUAL REPORT



3

FILE
102

AFFALD MISSION

The mission of the Air Force Acquisition Logistics Division is to improve USAF force readiness and reduce life cycle costs by challenging requirements and assuring consideration of supportability, reliability, and maintainability during the design, development and production processes of weapon system acquisition, and to direct acquisition programs which use already developed systems to meet operational needs.

AFPEA MISSION

The Air Force Packaging Evaluation Agency provides the Department of the Air Force with a packaging engineering capability that is available to all major commands and to certain other Federal agencies. To assure dynamic engineering and technical progress in packaging, the AFPEA investigates, designs, develops, tests, and evaluates containers, materials, methods, and techniques. It provides integrated logistics support planning for acquisition programs and assistance to program managers for packaging and transportability requirements.

INTRODUCTION

This Annual Report is published to furnish the Air Force and other services with information on our accomplishments during 1980. Highlights of our Agency's efforts and our goals for the immediate future are also included.

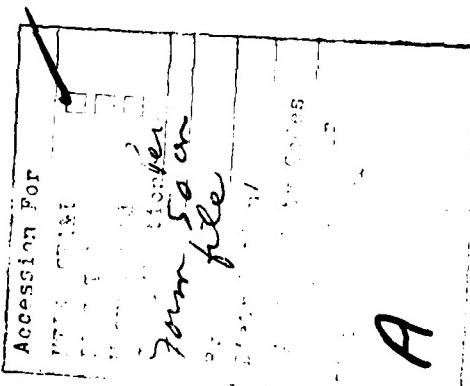
New personnel who joined the Agency during this past year are gaining in experience and expertise and proving to be extremely influential assets to our team. Progress is being made on several important efforts, and new projects are underway.

Packaging support, engineering, and testing related to new weapon systems in development and stages have been emphasized. The opportunities and involvement in new systems and equipment have been greatly enhanced under the organizational auspices of the Air Force Acquisition Logistics Division. The Agency has been assigned program manager for several specific containers in support of programs. Future expansions for these assignments are foreseen as the items and savings are identified.

Plans are being made to implement computer-aided designs for Air Force containers. Features will include standard container modules and hardware with capabilities for structural analysis and storage and retrieval of designs. The system will be expanded to include remote access by the Air Logistics Centers as the data base becomes established.

Continued emphasis is being placed on achieving DOD packaging goals to identify costs, provide incentives for packaging, and develop performance specifications. A newly developed Life Cycle Cost Model for containers will assist in selection of more cost-effective approaches.

We encourage submission of any pertinent information relative to meeting these goals or comments on items in this report.



DTIC
ELECTED
NOV 30 1981

REPORT NO.	TITLE	PROJECT ENGINEER	*AD NUMBER
PTPT 80-1	Evaluation of a Reusable Fiberglass Shipping Container for the F-16 Fire Control Radar System	F. Jarvis	AD B045466L
PTPT 80-2	Improved Packaging for the LN31 Inertial Measurement Unit (F-15 Aircraft)	F. Jarvis	AD A081745
PTPT 80-3	Packaging and Shipping Analysis of the C-5A Displacement Gyro	F. Jarvis	AD A081679
PTPT 80-4	Effect of Improved Packaging on Maintenance and Packaging Costs of Aircraft Inertial Guidance Components (Interim Report)	F. Jarvis	
PTPT 80-5	Field Test Results for Logistics Environmental Study (Interim Report)	F. Jarvis	
PTPT 80-6	Evaluation of Polyimide Flexible Foam	P. Robbins	AD A082742
PTPT 80-7	Evaluation of Handling Aide/Shipping Container for the F-111A Navigation Computer Unit (Interim Report)	D. Sheeter	
PTPD 80-8	Test and Evaluation of Expendable Kraft Honeycomb Pallets (Interim Report)	E. Kowalski	
PTPD 80-9	Flexible Shipping and Storage Aircraft Engine Container (Interim Report)	E. Kowalski	
PTPD 80-10	Evaluation of the F100-PW-100/F100-PW-200 Core Engine Module Container	J. Steiger	AD A085837

*The reports identified with an AD number are available through the Defense Technical Information Center, Cameron Station, Alexandria VA 22314.

REPORT NO.	TITLE	PROJECT ENGINEER	AD NUMBER
PTPT 80-11	Evaluation of a Reusable Container for Laser Acquisition Electronic Units	D. Sheeter	AD B048625L
PTPT 80-12	Pressure Testing of MIL-C-1283, Five-Gallon Gasoline Cans (Interim Report)	E. Thomas	
PTPT 80-13	Evaluation of GBU-15 T.V. Guidance Section Fragility	E. Moravec	AD B048616L
PTPT 80-14	Evaluation of Dynamic Cushioning Characteristics of Type I Fast Packs (Interim Report)	D. Sheeter	
PTPD 80-15	Test and Evaluation of Expendable Kraft Honeycomb Pallets (Interim Report)	E. Kowalski	
PTPT 80-16	Evaluation/Redesign of the F-105 Pitch Rate Gyro Pack	J. Heck	AD A092109
PTPT 80-17	Evaluation of GBU-15 Control Section Shipping Containers	E. Moravec	
PTPD 80-18	Shipping and Storage Container for M-16 Rifles (Category I, Long Life) (Interim Report)	E. Kowalski	
PTPT 80-19	Environmental Test of Coder Control Test Set (Interim Report)	T. Smith	
PTPT 80-20	Performance Evaluation of Modified Type IV (XG3) Fast Pack	D. Sheeter	AD A093657
PTPT 80-21	Evaluation of Polyurethane Package Cushioning Foam (Interim Report)	M. Horn	
PTPD 80-22	Test and Evaluation of Foam-In- Place Fuel Tank Container	S. Chuang	

AFPEA PROJECTS

	Page
Redesign of Cargo Mobility Containers	5
DOD Standardization Program	6
Computer-Aided Design (CAD) System	7
Design Criteria for Container Performance in Low Temperature Environments	8
Foam-In-Place Fuel Tank Containers	9
Fastener/Closure System Selection Guidelines	10
Shelterized Equipment Damage	11
Engine Container Modification	14
Fast Pack Specification Revision	14
Maverick Missile Container	15
F-107 Cruise Missile Engine Container	15
Tactical Electronics Reconnaissance Systems Support Equipment, AN/ALQ-125	16
Simulation Technique for Evaluating Containers	16
Packaging Management Plan, Proposed Data Item Description	17
Development and Testing of Cushioned Adjustable Mounting System Pack	17
Development of Fire Hazards Test Method(s) for Packaging Materials	18
Evaluation of T-39 Displacement Gyro Pack	18
Shipping Label Study	19
Investigation of Bearing Corrosion Problem	19
Irreversible Humidity Indicators	20
Evaluation/Redesign of the F-105 Pitch Rate Gyro Pack	21
Development of a Low Fragility Container for Avionics	22
Compression Set Requirements/Test Methods for Bonded Fiber Cushioning Material	23

REDESIGN OF CARGO MOBILITY CONTAINERS

AFPEA has been assigned program management for development and implementation of an aggressive US Air Force Mobility Enhancement Program for shipping/storage of War Readiness Spares Kits and Combat Follow-On Supply Support. A family of newly configured containers will be designed to maximize cube usage of 463L pallets on C-141/C-130/C-5 and KC-135 aircraft and also on the KC-10 and the new C-X aircraft when deployed. The new containers will be capable of distribution within ISO containers and the lower lobe of Civil Reserve Air Fleet in anticipation of mobilization requirements. A conservative estimate of 30% increase in cube usage of cargo-related flights can be achieved in cargo mobility operations. An improved cargo handling capability for the current mobility container will also be evaluated to overcome the floor-loading limitations on KC-135 aircraft.

(Dr. Shui-Nan Chuang, AFALD/PTPD, (513) 257-3120, AV 787-3120)

AFALD LESSONS LEARNED

SPEC. ATA No. 300 FOR COMMERCIAL CONTAINERS
AIR TRANSPORT ASSOCIATION SPECIFICATION No.ATA-300
FOR COMMERCIALLY AVAILABLE POLYETHYLENE SHIPPING
CONTAINERS DOES NOT NECESSARILY INCLUDE A LOW
TEMPERATURE MATERIAL FORMULATION FOR PACKAGING
FRAGILE GUIDANCE COMPONENTS . BASED ON TESTS
CONDUCTED AT THE AFPEA

DOD STANDARDIZATION PROGRAM

The Packaging Evaluation Agency is assigned Air Force responsibility for standardization actions in the following Federal Stock Classes:

FSC 8105 Bags and Sacks

FSC 8110 Drums and Cans

FSC 8115 Boxes, Cartons and Crates

FSC 8125 Bottles and Jars

FSC 8130 Reels and Spools

FSC 8135 Packaging and Packing, Misc. Materials

FSC 8145 Specialized Shipping and Storage Containers (DOD Assignee)

MISC* Miscellaneous

PACK* Packing, Packaging, Preservation and Transportability

*Selected documents only - as designated in the DODISS.

The Agency is also responsible for several publications in the Air Force Technical Order 00-85 series.

(Mr. Edwin Reynolds, AFALD/PTPT, (513) 257-4234,
AV 787-4234)

COMPUTER-AIDED DESIGN (CAD) SYSTEM

Development of a computer-aided design system capability for preparing Transportation Packaging Orders (TPOs) and other specially designed containers to protect USAF assets is in progress. The CAD system will also be used to perform structural analysis of containers, simulate destructive tests, and evaluate contractor proposed container designs. A centralized design-drawing data base will be established for interactive storage and retrieval to decrease duplication of design efforts and to provide instant access to TPOs, container design drawings, and engineering data. The scheduled installation date for the basic CAD system is October 1981. The date for installation of work stations at other AFLC activities is March 1982. A communication link will be established to access a large scale computer for finite element structural analysis. AFPEA is the focal point for the CAD system and will provide technical guidance to other AF design activities, maintain the software programs and design-drawing data base, and monitor the computer hardware.

(Dr. Shui-Nan Chuang, AFALD/PTPD, (513) 257-3120, AV 787-3120)

DESIGN CRITERIA FOR CONTAINER PERFORMANCE IN LOW TEMPERATURE ENVIRONMENTS

From a container design standpoint, -40° F instead of -65° F has been established as an adequate low temperature extreme for use in designing, testing, and evaluating containers. This is based on the data collected over a 30-year period at 98 USAF bases worldwide which indicates that weapons, aircraft engines, and their components will be exposed in the most extreme case to -24° F within the 99th percentile with 1% risk level and that only at one base would these components be exposed to temperatures below -40° F in the 90th or higher percentiles at a 1% risk level. Testing containers at -65° F has, in the past, eliminated many cost-effective new materials that industry has used in container construction. Establishing -40° F as the standard low temperature extreme will provide adequate design criteria for containers without imposing undue costly requirements.

(Dr. Shui-Nan Chuang, AFALD/PTPD, (513) 257-3120, AV 787-3120)

AFALD LESSONS LEARNED

TIME BETWEEN OVERHAUL AND MEAN TIME BETWEEN FAILURE

**DOWNTWARD TRENDS IN THE TIME BETWEEN OVERHAUL
(TBO) AND MEAN TIME BETWEEN FAILURE (MTBF) FOR
AVIONICS EQUIPMENT CAN SERVE AS AN INDICATOR OF
POSSIBLE HIDDEN DAMAGE DUE TO PACKAGING
DEFICIENCIES.**

FOAM-IN-PLACE FUEL TANK CONTAINERS

A development project is under contract to design and fabricate foam-in-place (FIP) containers for assembled aircraft fuel tanks designated as war reserve material. Under this project, two FIP, reusable, fuel tank containers will be fabricated using a production line molding technique thus eliminating the outer container normally used with FIP. One single pack, F-100, 200-gallon fuel tank container has been delivered and successfully passed a complete mechanical and environmental test by AFPEA. Some improvements resulting from this evaluation have been incorporated into the fabrication of the prototype container for the F-4, 370-gallon fuel tank. The FIP technique offers significant advantages over present methods, especially in providing environmental protection to the fuel tanks during long-term storage. Program objectives are to extend inspection cycles, reduce life cycle costs, improve environmental protection and increase reliability. The containers will be fully reusable for mobility support.

(Dr. Shui-Nan Chuang, AFALD/PTPD, (513) 257-3120, AV 787-3120)

AFALD LESSONS LEARNED

CHEMICAL PERFORMANCE FOR FOAM IN PLACE PACKAGING

**AIR FORCE FOAM IN PLACE (FIP) DISPENSING EQUIPMENT
IS NOT COMPATIBLE WITH ALL CHEMICAL FORMULATIONS
OF FOAM FURNISHED BY VARIOUS SUPPLIERS.**

FASTENER/CLOSURE SYSTEM SELECTION GUIDELINES

Fastener/closure system selection guidelines are being developed for reusable shipping and storage containers such as those which require Method II preservation, i.e., storage in water-vaporproof, desiccated containers. Included are fuel tank, missile, engine, and general purpose shipping and storage containers. Improvements in reliability, durability, ease of operation and other performance characteristics are sought for container use. Work has been conducted to evaluate existing fastener systems which include gasket and flange designs. This information will be used in preparation of a new fastener performance MIL-STD for application in procurement documents when new shipping/storage containers or container systems are needed. Progress on this effort has been delayed due to personnel losses.

(Mr. Perry Quijas, AFALD/PTPD, (513) 257-3120, AV 787-3120)

AFALD LESSONS LEARNED

DESIGNING FOR LOW TEMPERATURE ENVIRONMENTS

STUDIES HAVE REVEALED THAT -40° F INSTEAD OF -65° F IS THE LOWEST ACCEPTABLE TEMPERATURE EXTREME FOR EVALUATING SHIPPING AND STORAGE CONTAINERS

SHELTERIZED EQUIPMENT DAMAGE

Tactical shelters containing electronic equipment to meet mobility requirements of systems are generally supported by separate environmental control provisions during operational use. A relatively mild interior temperature is needed both for personnel comfort and for the equipment to operate efficiently. However, the AFPEA learned that expensive electronic material is being damaged by corrosion, as the shelters have no effective humidity controls for use when the system is passive or otherwise nonoperating. System documents/specifications for shelter use should contain requirements that incorporate integral humidity control provisions. They are needed to ensure a moisture-free environment when the "loaded" shelter is in storage or transportation. Development of hardware is planned for FY 81/82 for a unit that can be installed on vans/shelters in the system, as well as for new ones being procured. Improved environmental protection will extend the inspection cycle and also increase the reliability of the equipment.

(Mr. Edward Kowalski, AFALD/PTPD, (513) 257-3120, AV 787-3120)

AFALD LESSONS LEARNED

**BLOCKING AND BRACING OF THE HORIZONTAL
STABILIZER LEADING EDGE (C-141)**

**TRANSPORTATION/PACKAGING INSTRUCTIONS SHOULD BE
INCLUDED WITH ALL SPECIALIZED CONTAINERS**

PACKAGING EVALUATION
J.E. THOMSON B70
J. HALL
R. ZYNDAL
M. VENET

EVALUATION A
SON B70 Rm2

112

ENGINE CONTAINER MODIFICATION

Engineering support is being provided to Oklahoma City Air Logistics Center in the design, modification, and testing of metal engine containers to make them free-breathing. This will decrease the cost of maintenance and eliminate the potential hazard of exploding pressurized containers. As planned, the free-breathing metal containers will provide physical protection and a bag within the metal container will provide corrosion protection. Tests have been performed to compare a flexible bag and polyethylene wrap within a metal container. Materials have been developed for an acceptable water vapor transmission rate for the bag. However, additional design and development is in progress to further develop the closure system. Testing and evaluation is continuing to select the best materials and closure combination for this application.

(Mr. Edward Kowalski, AFALD/PTPD, (513) 257-3120, AV 787-3120)

FAST PACK SPECIFICATION REVISION

Revision D of Federal Specification PPP-B-1672, "Boxes, Shipping, Reusable, with Cushioning", has been prepared for initial coordination. The main thrust of this new revision is to provide basic performance data for procurement of Fast Packs made from both corrugated fiberboard and plastic materials. Other changes include an update of technical data, references, first article preproduction tests and new standard sizes.

(Mr. Perry Quijas, AFALD/PTPD, (513) 257-3120, AV 787-3120)

MAVERICK MISSILE CONTAINER

A new container for the "E" version of the Maverick missile is required. The "E" model is basically the same configuration as the other models but is heavier. Thus, some design changes are required. AFPEA assisted the system program office in writing a Product Improvement specification using new manufacturing techniques and requalifying specifications which also incorporate Navy requirements for shipboard use of the container. AFPEA will participate in the container requalification tests which are scheduled for FY 82.

(Mr. Al Barringer, AFALD/PTPP, (513) 255-6901, AV 785-6901)

F-107 CRUISE MISSILE ENGINE CONTAINER

At the request of the Acquisition Packaging Division of AFPEA, the office for Life Cycle Costs (AFALD/XRS) performed an engine container study on Air Launch Cruise Missile engine container requirements. The object of the study was to provide recommendations for the selection of a cost-effective engine container comparing six different container approaches. Study results indicated a large savings over the system program life. Additional savings were anticipated through standardization of containers for Air Launch Cruise Missile, Ground Launch Cruise Missile, and Sea Launch Cruise Missile engine requirements. Accordingly, the decision was made for AFPEA to manage the procurement. Requirements were developed and contract actions initiated. Contract award by March 1981 is to be determined using lowest life cycle cost criteria.

(Capt Ronald Ege, AFALD/PTPP, (513) 255-6901, AV 785-6901)

TACTICAL ELECTRONICS RECONNAISSANCE SYSTEMS SUPPORT EQUIPMENT, AN/ALQ-125

A need for rapid deployment of the Tactical Electronics Reconnaissance Systems Support Equipment, AN/ALQ-125, resulted in a requirement for containers which would meet a specified time frame for loading and unloading the support equipment. An Engineering Change Proposal was submitted to the Program Manager (ASD/RWWL) by the equipment manufacturer for the modification of the support equipment. Environmental protection/transportability requirements were included in the modification plan but were rejected in favor of open competition for the fabrication of the containers. Requirements were developed and contract action initiated for the containers. Contract award is expected by June 1981.

(Mr. Frank Jarvis, AFALD/PTPP, (513) 255-6901, AV 785-6901)

SIMULATION TECHNIQUE FOR EVALUATING CONTAINERS

AFPEA has been working with AFALD's Logistics Support Analysis Division to develop a computer life cycle cost model to evaluate trade-offs involving various shipping containers and transportation modes. Variables may be input for container cost and size, transportation costs, shipping schedules, and item requirements. The model will provide a standardized and simplified procedure to determine life cycle costs of container options for program planning, analysis, and evaluation. At this time, the draft user handbook is being edited and will soon be tested in conjunction with the program. Implementation is expected for October 1981.

(Mr. John Armstrong, AFALD/PTPP, (513) 255-6901, AV 785-6901)

PACKAGING MANAGEMENT PLAN, PROPOSED DATA ITEM DESCRIPTION

To increase cost visibility and management controls, a packaging management plan and associated statement of work input have been developed. This proposed data item will be used to evaluate proposals and provide technical assistance to source selection boards in the functional area of packaging. It will also be used to manage packaging efforts after contract award. It requires contractors to furnish information regarding proposed interfaces between packaging and system engineering, life cycle costing, and identification of packaging problems. The packaging management plan has been forwarded to HQ AFSC and HQ AFLC for distribution and testing its application.

(Mr. John Armstrong, AFALD/PTPP, (513) 255-6901, AV 785-6901)

DEVELOPMENT AND TESTING OF CUSHIONED ADJUSTABLE MOUNTING SYSTEM PACK

Assistance is being provided to WR-ALC/DSPCB in the development of a cushioned, adjustable, mounting system for computer equipment. The concept involves the use of shock isolated metal brackets which can be bolted to the skids of wood crates used for the shipment of computer consoles. It is planned to have a full set of brackets for different sizes and weights of computer consoles. Information is currently being gathered on the physical characteristics of the computer consoles proposed for shipment with the brackets. This information will be used to select shock isolators which will provide the required level of protection.

(Mr. Ted Smith, AFALD/PTPT, (513) 257-7445, AV 787-7445)

DEVELOPMENT OF FIRE HAZARDS TEST METHOD(S) FOR PACKAGING MATERIALS

A one-year contract was awarded to Ohio State University to develop test method(s) that will accurately predict the flammability characteristics of packaging materials either singularly or in combinations representative of the manner in which they are used. The standard test methods now used have been increasingly criticized for their inability to predict the fire hazards of materials in actual situations. A major objective of the contractual effort is development of a test method(s) that will include various factors governing fire hazards such as ease of ignition, rate of flame propagation, rate of heat production, contribution of combustion products to a fire, toxicity of combustion products and the rate of smoke generation. Scheduled completion date of the contract is December 1981.

(Mr. Emil Thomas, AFALD/PTPT, (513) 257-4519, AV 787-4519)

EVALUATION OF T-39 DISPLACEMENT GYRO PACK

At the request of AGMC, packaging for the T-39 Gyroscope is being evaluated to determine if the design could be simplified to reduce costs and shipping volume. An analysis using the Agency's computer program for package cushion design indicates that corner pad cushioning may result in an improved pack for the gyro. Completed pack tests are currently under way.

(Mr. Matthew Venetos, AFALD/PTPT, (513) 257-4234, AV 787-4234)

INVESTIGATION OF BEARING CORROSION PROBLEM

At the request of OC-ALC, this Agency investigated the corrosion problems involving bearing seal housings for TF-30 aircraft engines. Foreign substances on the housings, component materials, and proprietary products used in every phase of processing were analyzed. Contaminates were found to be primarily tungsten, copper, and cobalt. These elements were present only in the foreign substances. It was concluded that the vendor's processing tanks were the most probable source of the contamination, not the method of packaging with volatile phase inhibitors as previously suspected. Subsequent investigations supported these conclusions. Adequate corrective measures have been taken to eliminate the problem.

(Mr. Avery Watson, AFALD/PTPT, (513) 257-4519,
AV 787-4519)

SHIPPING LABEL STUDY

Packaging activities at several Air Logistics Centers reported problems with adherence of the standard AFLC Form 571 label to fiber boxes and crates. Use of pressure sensitive label covers or application of protective coatings to correct the problem requires extra costs and labor. Several types of plastic and treated paper labels have been evaluated as possible alternatives to the label now used. Both plastic and paper labels with a special adhesive system were found to provide satisfactory results. A trial procurement and limited field test indicated that the paper label with a new adhesive system would be most cost-effective and compatible with the inking ribbons currently used.

(Mr. Matthew Venetos, AFALD/PTPT, (513) 257-4234, AV 787-4234)

IRREVERSIBLE HUMIDITY INDICATORS

Water-vaporproof containers are used for packaging items requiring protection against deterioration from water and water vapor during long-term storage. These containers are often equipped with externally mounted, reversible, color-change humidity indicators to provide inspection personnel with an indication of whether humidity conditions within the containers are at dangerously high levels. Reversible humidity indicators, however, only indicate the humidity conditions at the time of inspection, which varies with temperature and time of day. Irreversible humidity indicators provide inspecting personnel with an indication of whether humidity conditions have reached a dangerously high level at any time prior to inspection by irreversibly changing color when the maximum permissible humidity is reached. This Agency is investigating irreversible humidity indicators which change color when exposed to a relative humidity of approximately 55% for about 8 hours. A field test is to be conducted in 1981.

(Mr. Emil Thomas, AFALD/PTPT, (513) 257-4519, AV 787-4519)

EVALUATION/REDESIGN OF THE F-105 PITCH RATE GYRO PACK

As a result of an excessive damage rate and low Mean Time Between Failure (MTBF) reported for the F-105 Pitch Rate Gyro, a study was initiated to improve the protective packaging used with the gyro. Simulated performance testing revealed that a single free-fall impact from 30 inches resulted in shock intensities of 35-45 G being experienced by the gyro. In subsequent impacting on the same face of the pack, the shock transmitted to the gyro increased dramatically to a level of 75-90 Gs. These shock levels were far above the 15 G fragility rating for this gyro. Providing the proper level of protection for this item was complicated by its light weight and small size. However, by changing the item-bearing load and making stress-relief cuts in the cushioning material, a pack was developed which provides 12-14 G shock protection. OCA/LC/DSP has prepared a new Transportation Packaging Order implementing the introduction of the redesigned pack into the logistics system.

(Mr. Matthew Venetos, AFALD/PTPT, (513) 257-4234, AV 787-4234)

DEVELOPMENT OF A LOW FRAGILITY CONTAINER FOR AVIONICS

Because of a continuing requirement for protection of high value, fragile avionics equipment from the hazards of shock and vibration encountered during shipment, handling, and storage, a contractual effort was initiated in 1979 to develop a suitable packaging system. The goal is to develop a "family" of standardized packs which will provide enhanced shock and vibration protection at reduced costs. Prototype packs, with isolation systems designed to provide 15 G protection levels, are currently being subjected to free-fall drop tests and sinusoidal vibration tests. It is required that the packs provide protection to items varying in weight from 5 to 90 lbs. and having dimensions up to 24" x 20" x 20". This developmental effort includes a tie-down system which will be adaptable to irregularly shaped items and will prevent slippage of an item on the load-bearing platform.

(Mr. Matthew Venetos, AFALD/PTPT, (513) 257-4234, AV 787-4234)

AFALD LESSONS LEARNED

POLYURETHANE FOAM CUSHIONING

SUBSTANDARD POLYURETHANE FOAM CUSHIONING MATERIAL CAN CAUSE EXTENSIVE DAMAGE TO AIRCRAFT GUIDANCE COMPONENTS.

COMPRESSION SET REQUIREMENTS/TEST METHODS FOR BONDED FIBER CUSHIONING MATERIAL

The material used in the manufacture of rubberized hair cushioning material was changed from hog's hair to vegetable fiber due to an insect infestation problem. This change has resulted in an increase in the compression set characteristics of the cushioning material in excess of the specification limit of 7%. GSA has had to grant waivers for some purchase orders to allow up to 10% compression set. Current testing indicates that the compression set specifications of 7% maximum can be met with the vegetable fiber material if the samples are pre-worked prior to the compression set tests. Further verification tests are being performed by a major supplier as well as this Agency. Based on the results of these tests, it is anticipated that the specification of bonded fiber cushioning, PPP-C-1120A, will be amended to include the pre-working requirement in the compression set test method. In use and design, additional allowance will have to be made for the added compression set when using this material.

(Mr. Ted Smith, AFALD/PTPT, (513) 257-7445, AV 787-7445)

